

# MOVEMENTS OF *BANDICOTA BENGALENSIS* (GRAY 1873) AND *TATERA INDICA* (HARDWICKE 1807) AS REVEALED BY RADIO TELEMETRY<sup>1</sup>

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(With two text-figures)

Movements of 10 *Bandicota bengalensis* and one *Tatera indica* were monitored with radio telemetry over a two-month period. The *Tatera* had a home range 275 metres long. All the bandicoots had smaller home ranges, confining their movements to part of a 0.4-hectare field. Two adult females had ranges which enclosed the ranges of their young but did not overlap with each other. An adult male had a larger home range overlapping with all other bandicoots. Eventually all bandicoots seemed to make one-way long-distance movements away from the home field. The distance of four of these one-way movements were recorded and ranged from 340 to 640 metres. Increased density in the home field was thought to have stimulated these residents to move away.

## INTRODUCTION

Both *Bandicota bengalensis* and *Tatera indica* are known to be pests in several crops in Pakistan. In lower Sind, *Bandicota* is an especially serious pest in rice (Wagle 1927; Greaves *et al.* 1977). Although several aspects of the biology of *Bandicota* have been studied, little is known about its movements in agricultural lands. Frantz (1973) studied its movements in an urban environment and found the maximum range diameter to be 146 metres. The testing of new radio-telemetry equipment was used as an opportunity to study the movements of *Bandicota* and *Tatera* in an agricultural area in lower Sind, with the emphasis on *Bandicota*.

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## STUDY AREA

A large plot of land (about 400 hectares), located 5 kilometres south of Gharo village (24° 44'N, 67° 36'E) in Thatta District, Sind, supported a high bandicoot population. The area was divided into fields, about 0.4 hectare in size, all of which had been left fallow for at least one year. Herbaceous plant cover was generally quite dense, but there were occasional bare patches of saline soil. Seeds of *Coix lacrima-jobi* provided conspicuous and abundant food. Other common plants were *Scirpus maritimus*, *Typha angustifolia*, *Desmostachya bipinnata*, and *Cressa cretica*. Some fields contained sprouting rice stubble left from the 1976 rice season.

## MATERIALS AND METHODS

The telemetry equipment used was manufactured by AVM Instrument Company

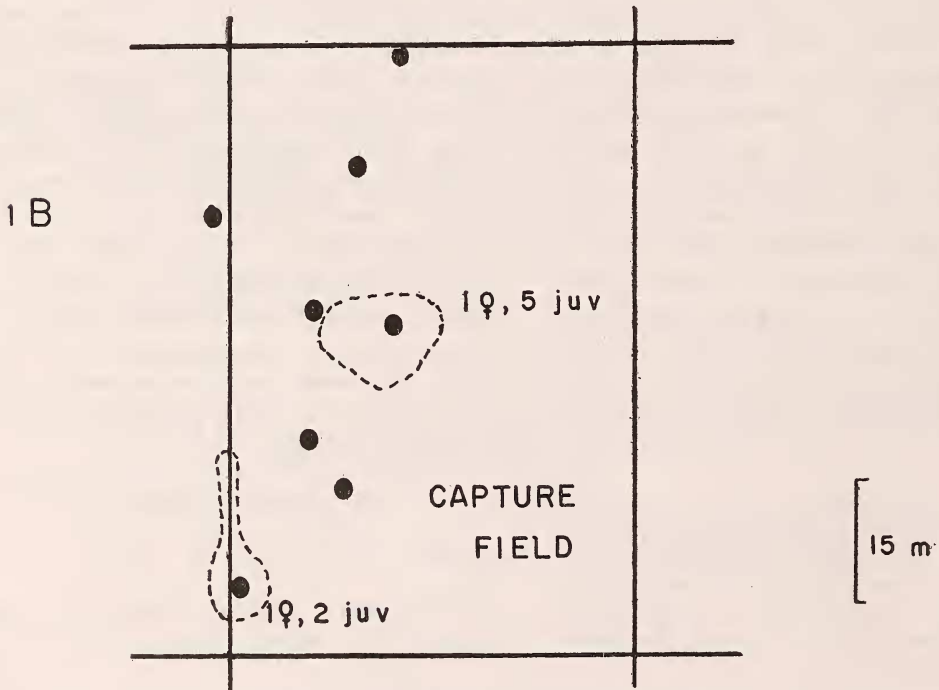
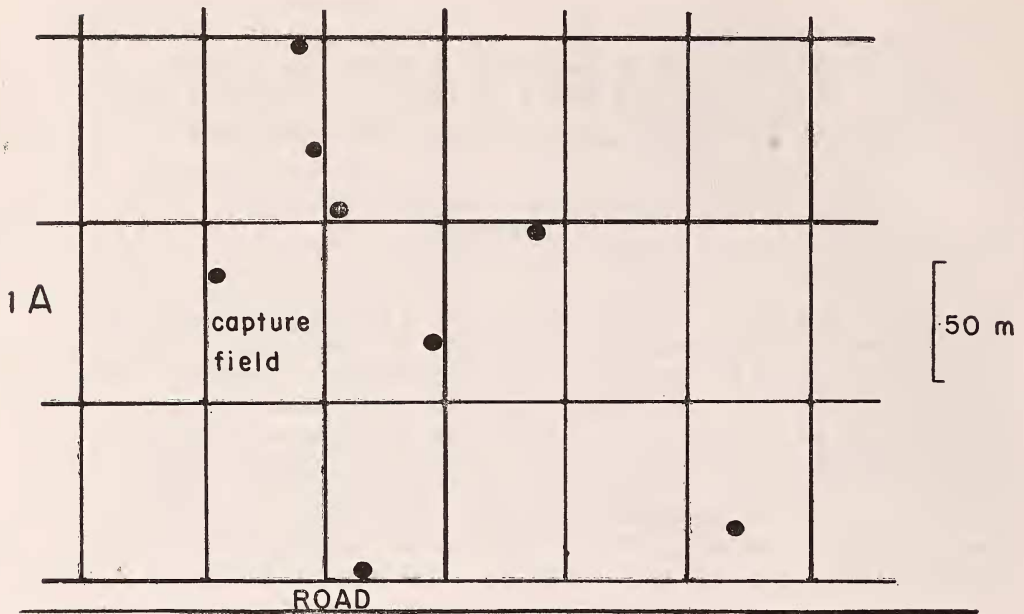


Fig. 1. A) Radio fixes of one *Tatera*, B) Radio fixes (ovals) of an adult male *Banadicota bengalensis* in the capture field and home ranges (dotted lines) of one adult female with five juveniles and of another adult female with two juveniles.

(Champaign, Ill. USA) and consisted of a receiver, hand-held yagi antenna and small transmitters fitted on neck collars. Two different sized transmitters were used weighing 3 and 9 grams. Theoretical life of the transmitters was over three months and we were able to receive signals from a distance of 50 to 250 metres depending on conditions. Locations (fixes) of transmitter-fitted animals were accurate to the nearest metre. With this antenna we had to approach the animal to make a fix.

On 20 November 1977, 10 *Bandicota bengalensis* and 1 *Tatera indica* were trapped from a single field in the study area. These animals were brought to the laboratory, anesthetized with an appropriate dose of 6% Sodium Thiopental, and fitted with a radio-collar. After a recovery period of at least 24 hours, the animals were released at their capture points. On 26 November, all animals were back in the field.

From 22 November until 1 February, 18 trips to the study area were made, at least one per week. In general, during each trip we tried to fix animals at least three times with 4-hour intervals between fixes.

## RESULTS

Two types of movements were observed. Movements that seemed to be part of the animal's daily behaviour are here called home range movements, following the definition of Burt (1943). One-way movements that resulted in a change of home site are called long-distance movements.

### *Tatera indica*

Only home range movements were observed in the single *Tatera* studied (Fig. 1A). This animal often was not located (Table 1), probably due to the depth of its burrows which greatly reduced the strength of the transmit-

ter signal. The longest axis of its home range was 275 metres. Large distances were sometimes moved in a short time. On 28 November it moved 70 metres in less than 4 hours and on 30 November 100 metres in the same time interval.

### *Bandicota bengalensis*

Most bandicoots were located in the original capture field during every search from 22 November to 7 December (Table 1). Home ranges of the 10 bandicoots fell into three groups (Fig. 1B). One group, consisting of one adult female (No. 9) and five juveniles (Nos. 10 through 14), had overlapping home ranges near the centre of the field. Another adult female (No. 7) and two juveniles (Nos. 5 and 6) had overlapping ranges along the small embankment bordering the field. The single adult male (No. 2) had a larger home range covering the home ranges of the other bandicoots. During the night of 30 November, the adult male shifted its home range to a field 300 metres away from the capture field (Fig. 2). It remained in the new location until 7 December after which it could not be located.

Between 7 and 9 December, seven of the remaining nine bandicoots could not be located. Intensive live trapping in the capture field resulted in the capture of the two animals (Nos. 5 and 6) already known to be there and 16 young less than a month old. An intensive search with the radio receiver of more than a 10-hectare area around the field failed to locate any of the animals, suggesting that animals had moved several hundred metres away. This suggestion was partly confirmed on 16th January, when one (No. 12) of the disappeared animals was located at a distance of 640 metres from the capture field (Fig. 2).

Radios on the two animals (Nos. 5 and 6) taken with live traps were working on 12 December, the date of recapture. The collars

TABLE 1  
 DATES WHEN ANIMALS WERE LOCATED WITH RADIO RECEIVER DURING A TWO-MONTH STUDY

Rat Number	Sex	Weight	Date of search												LDM	ORL										
			22 Nov	26 Nov	28 Nov	30/1 Dec	3/4 Dec	7/8 Dec	9/16 Dec	19 Dec	24 Dec	31 Dec	2/3 Jan	7/8 Jan			12 Jan	14 Jan	15 Jan	16 Jan	17 Jan	25 Jan	1 Feb			
Tatera	4	M	135	+	0	+	+	0	+	0	+	0	0	0	0	0	+	-	-	-	-	-	-	-	275	
Band	2	M	240	+	+	+	+	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	340
"	5	F	45	+	+	+	+	+	+	+	+	+	+	+	+	+	+	0	-	-	-	-	-	-	450	
"	6	F	65	+	+	+	+	+	+	+	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	460
"	7	F	180	+	+	+	+	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47
"	9	F	175	-	+	+	+	+	+	+	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16
"	10	F	90	-	+	+	+	+	+	+	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13
"	11	F	60	-	+	+	+	+	+	+	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16
"	12	M	70	-	+	+	+	+	+	+	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	640
"	13	F	75	-	+	+	+	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
"	14	M	75	-	+	+	+	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32

+ = animal located, 0 = animal not located, - = animal known not to be in the field, LDM = long distance movement, ORL = observed home range length.

MOVEMENTS OF BANDICOTA BENGALENSIS AND TATERA INDICA

100 m

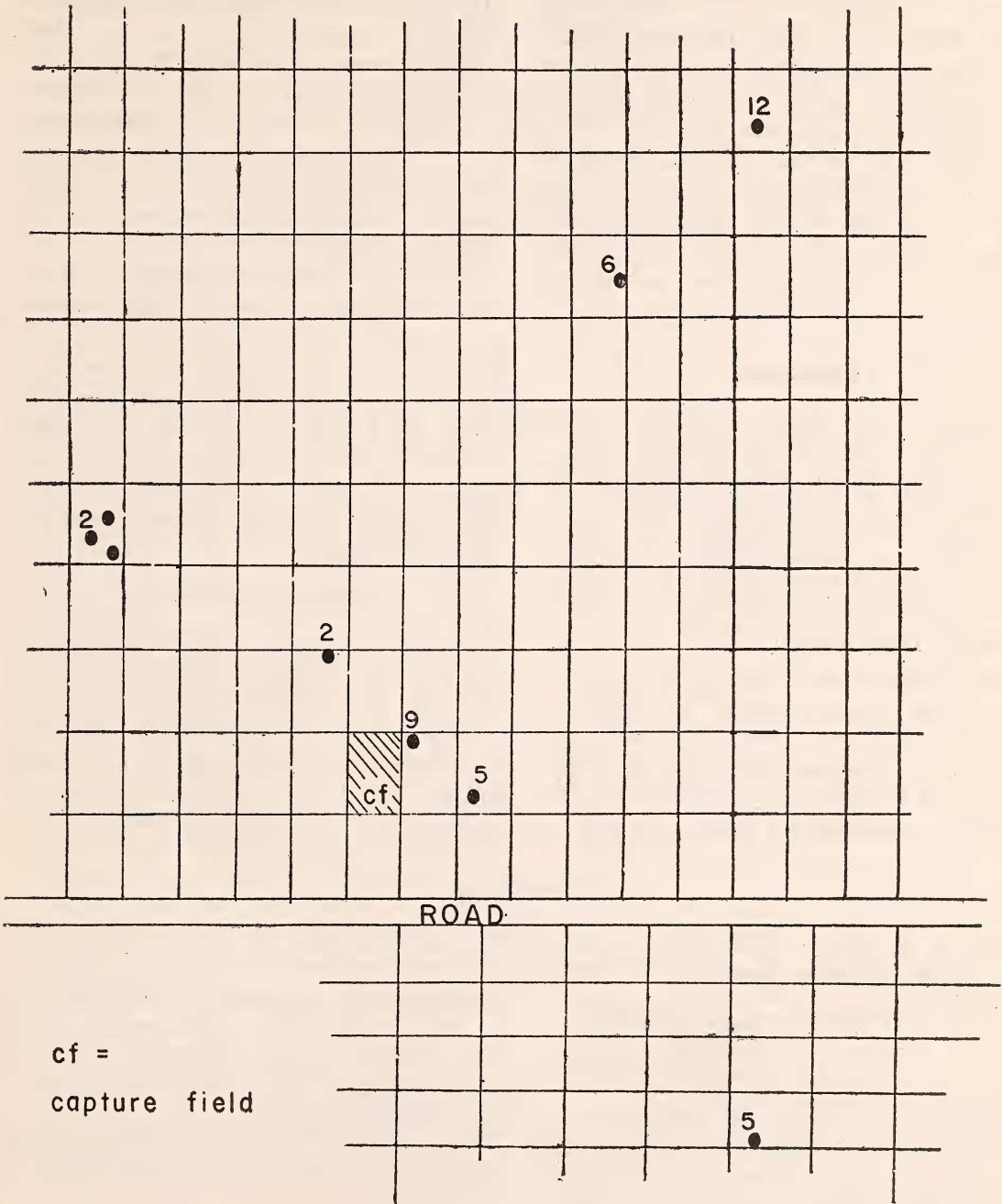


Fig. 2. Radio fixes of five *Bandicota bengalensis* outside the capture field; numbers refer to individual animals as in Table 1.

were enlarged, since the animals had grown, and animals released in the capture field. Animal No. 6 disappeared but was finally found on 16 January 460 metres from the capture field (Fig. 2). Animal No. 5 set up residence in a nearby field where it remained until 14 January when this field was flooded by irrigation water. This animal could not be found on 14 or 15 January. On 16 January it was found active in the daytime and was observed to move 300 metres in two hours. It was captured by hand 450 metres from the capture field in the afternoon of 16 January.

### DISCUSSION

The home range length (275 metres) of the single *Tatera* seems to be quite large compared to that of most small mammals (see literature reviews in Frantz 1973; and French *et al.* 1975). In contrast, during the first week of the study, the 10 bandicoots had smaller home ranges, about the size which is often reported for other rodents.

Long distance movements of more than 300 metres away from the home field were recorded for four bandicoots, two males and two females. It seemed likely that the disappearance of the other six bandicoots was due to similar migrations. Of course, the possi-

bility of predation or technical failure of the transmitters could not be excluded.

It was not known what might have stimulated these animals to leave the home field. Most disappeared on or near the same date. There were no apparent changes in the habitat. Live trapping to recover the missing animals showed that the bandicoot density was greatly increasing due to recruitment of young. Perhaps this increased density stimulated residents to leave the field.

The failure to locate six of the 10 bandicoots could have been due to dead transmitters or predation. However, we feel it was more likely that at least some animals moved out of the searched area. This would mean they moved one kilometre or further. The ability of *Bandicota bengalensis* to move over long distances in search of a home site is an adaptation for survival in crop lands where seasonal changes are great.

### ACKNOWLEDGEMENTS

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